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SHORT COMMUNICATION

A simple new technique designed for basic equipments used in experimental pharmacology

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Abstract

The research to discover a new drug is never ending phenomenon. The main aim of experimental pharmacology is to find out a therapeutic agent, suitable for human use. Preclinical experimental pharmacology involves the identification and optimization of novel chemical lead structures and testing on animals and animal tissues or organs for their biological actions. A technique designed for pharmacy and non-pharmacy students in particular for bioassay method and *in situ* method, to observe the effect of various drugs in isolated organs of the animal in experimental pharmacology. Recording levers are used to record the contraction or relaxation of the isolated tissue preparation. A celluloid tip of refill cut from marketed sketch-pen and pointer is fixed to it, which can be used along with simple, frontal writing and starling's heart levers *etc*. This new technique is designed and practiced by Md. Liyakat Ahmed**,** since 2007. Hence, it is named as ***'Liy-levers'*** technique. The parasympathetic effect of acetylcholine on frog's rectus abdominis, isolated muscle preparation by using interpolation bioassay method and effect of various drugs on isolated frog's heart, results shown in the form of graphical peaks, recorded by the following same technique.

Key words: *In situ*, Technique, *'Liy-levers'*, Experimental pharmacology

Introduction

The research to discover a new drug is never ending phenomenon. Pharmacology, during last two decades, has expanded so rapidly that, the perennial problem of any text is that keeping it 'up to date'. The main aim of experimental pharmacology is to find out a therapeutic agent, suitable for human use; study the toxicity of a drug; and study the mechanism and site of action of drugs. Since experimental pharmacology involves the discovery of new drugs or to study the actions of existing drugs, it is done in two main stages, *i.e.* preclinical experimental pharmacology which involves the identification and optimization of novel chemical lead structures and testing on animals and animal tissues or organs for their biological actions, and the second stage like clinical pharmacology where testing of drugs on human volunteers is done. It is quite apparent that a student of pharmacy should have an adequate exposure and background to experimental pharmacology during his undergraduate curriculum. A technique designed for pharmacy and non-pharmacy students in particular for bioassay method and *in situ* method, to observe the effect of various drugs in isolated organs of the animal in experimental pharmacology (Kulkarni, 1999 and Sharma and Sharma, 1999).

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Methodology

Liy-levers' experimental technique in pharmacology

Recording levers are used to record the contraction or relaxation of the isolated tissue preparation. As shown in (Figures a-d), celluloid tip of refill cut from marketed sketch-pen and pointer is fixed to it, which can be used along with simple, frontal writing and starling's heart levers *etc*. This new technique is designed and practiced by Md. Liyakat Ahmed, Faculty, Department of Pharmacology, Luqman College of Pharmacy, Gulbarga, since 2007, hence, it is named as ***'Liy-levers'*** technique. To the best of the author's knowledge, he is the first to design this modified technique.

The results shown in the form of graphical peaks (Figures 1and 2) are recorded by the following same technique.

Figure (a)

Figure (b)

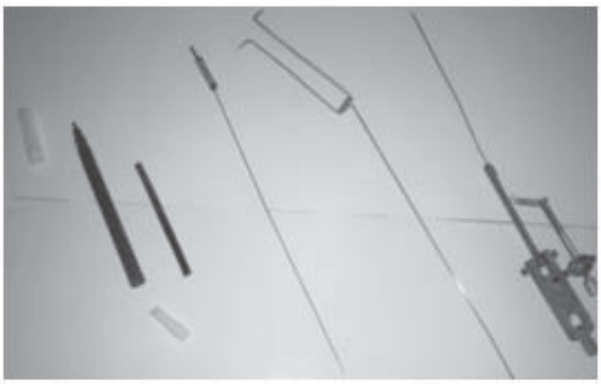

Figure (c)

Figure (d)

Advantages compared to previous technique

(i) It is non-carcinogenic, easy to handle, economic and time saving technique.

(ii) Non-smoked glazed paper can be used for recording graphical peaks on Sherrington rotating drum.

(iii) No need for gas, kerosene, winding up gear, smoking stand, smoking chamber *etc*.

(iv) No requirement of fixing solution (a saturated solution of shellac / colophony in alcohol), is allowed to stand for a week and process of drying.

(v) Different colours can be used for distinguish standard, test and various other compounds.

Precaution: Protect from water

Requirements and Chemicals

Animal: Frog: Drugs: Digoxine, Adrenaline, Acetylcholine 10 microgram, Calcium chloride, Potassium chloride 10mg.

Animals: CPCSEA (Committee for the Purpose of Control and Supervision on Experiments on Animals) guidelines were followed throughout the study and the protocol was approved by the IAEC (Institutional Animal Ethical Committee) No. 346, Luqman College of Pharmacy, Gulbarga, Karnataka, India.

Results and Discussion

Receptors, the original concept was introduced by Ehrlich and Langely as early as late nineteenth and twentieth centuries. It is now well established that receptors are part of macromolecular complexes on effector cells with which drug molecules interact to produce effect. The receptors differ from one another, depending on the endogenous substances or drugs with which they combine to produce effects. In general, the receptors are related to acetylcholine, noradrenaline, dopamine, 5-HT, histamine, purine, gamma-aminobutyric acid, opiates, benzodiazepines, *etc*. Dales classified cholinoceptive sites into two major types: (i) Muscarinic and (ii) Nicotinic, depending on the responsiveness of the receptors to these substances. Muscarinic receptors are in relation to the parasympathetic effector cells, *e.g*., cardiac and smooth muscles and exocrine glands. These are also present in the central nervous system and in the ganglion cells which differ from each other and from those in peripheral tissues. There are three variants of nicotinic receptors in terms of responsiveness to agonists, Neuromuscular junction-motor end plates of skeletal muscles (Ghosh, 1984). Rectus abdominis muscle is a skeletal muscle, and the response of acetylcholine is described as nicotinic response. Interpolation bioassay method is that the sensitivity of the tissue is first determined by prior plotting of concentration-response curve with the known agonist as is the case with acetylcholine. If the linearity of the curve is good, one can do very accurate estimate of the

test substance (Kulkarni, 1999). Recorded the concentration response curve due to acetylcholine, using the standard acetylcholine solution (Figure 1). Recorded the responses due to 0.1, 0.2, 0.4 and 0.8 of the test substance, these responses would have fall on the linear portion of the concentration-response curve for the standard solution.

Drugs may influence the rate (chronotropy) and force (inotropy) of concentration of the heart. An increase in the heart rate is called a 'positive chronotropic' response, while a 'negative chronotropic' response is a decrease in the heart. Similarly, an increase in the force of contraction is called a 'positive inotropic' response and a decrease in the force of contraction is called a 'negative inotropic' response. Sympathomemitic amines such as adrenaline and noradrenaline produce positive inotropic and positve chronotropic response. Whereas parasympathomemtics such as acetylcholine produce, negative inotropic and negative chronotropic response. When the cardiac musculature fails to obey this relationship as in failing heart, *i.e.*, congestive heart failure. There will be decrease in stroke volume (cardiac output), incomplete emptying of the ventricles during systole and enlargement of heart size, due to residual blood in the heart at the end of systolic contraction. When the heart is in this state, inability to contract to physiological normal, it is said to be a hypodynamic heart. Experimentally hypodynamic heart can be produced by perfusing the heart with Ringer containing less quantity of calcium as this bivalent ion is essential for myocardial contraction (Kulkarni,1999). According to Figure 2, heart is modified by administer digoxine and calcium chloride noted the change in contractility.

References

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Figure 1: Effect of Acetylcholine on Frog's rectus abdominis isolated muscle preparation by using interpolation bioassay method

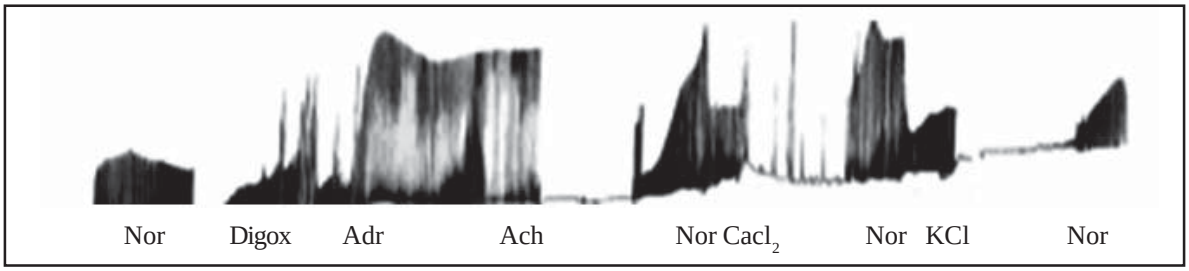

Figure 2: Effect of various drugs on isolated Frog's heart

Nor	Normal
Digox	Digoxine
Adr	Adrenaline
Ach	Acetylcholine
$CaCl_2$	Calcium chloride
KCl	Potassium chloride.